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THE MISSOURI BOTANICAL GARDEN.

FIRST ANNUAL REPORT OF THE DIRECTOR, FOR 1889.

SUBMITTED TO THE TRUSTEES, JAN. 14, 1890.

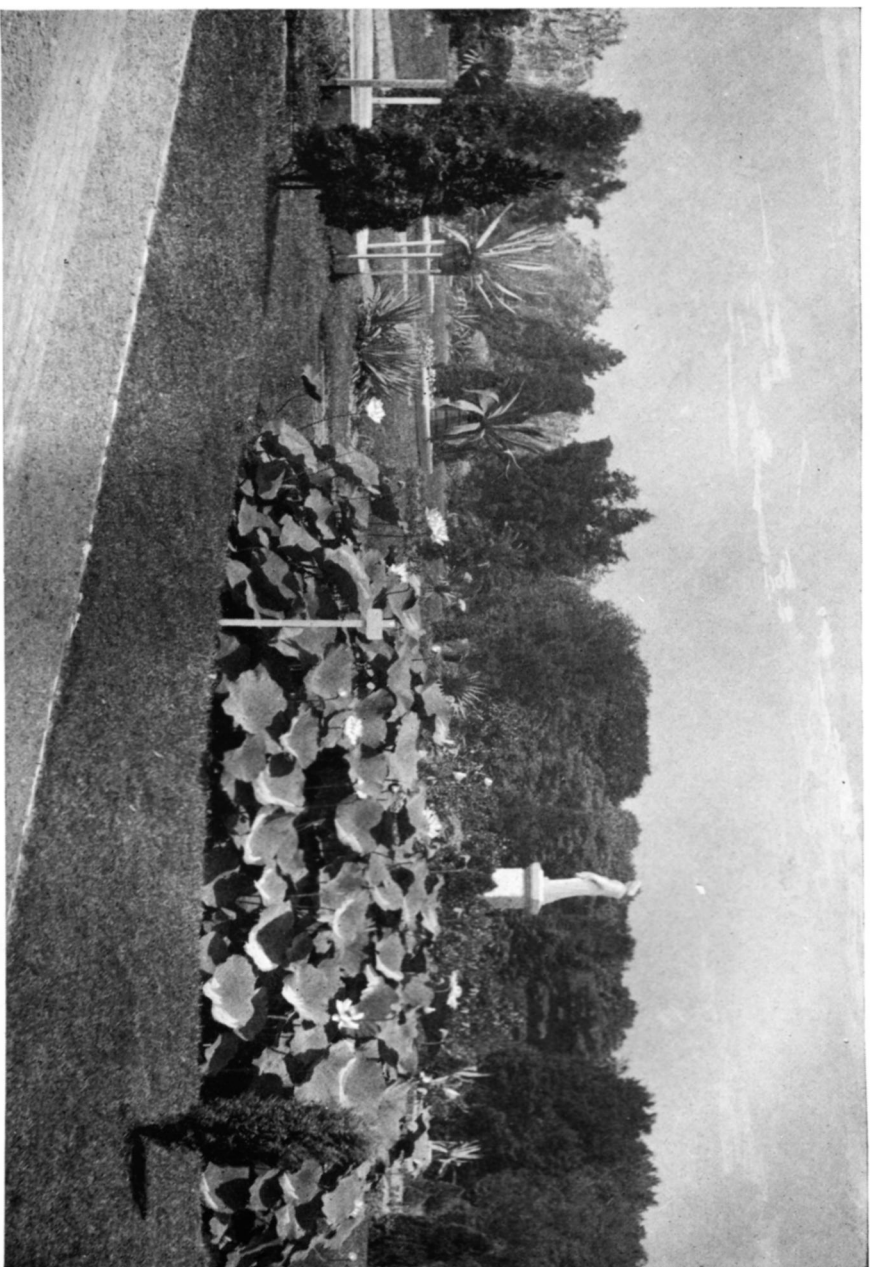
To the Trustees of the Garden:

In accordance with the rules and regulations of the Board of Trustees, I respectfully submit the following report on the condition and prospects of the Botanical Garden, and of the School of Botany therewith connected.

On assuming control of the Garden, on the 12th of September last, I found that much work was necessary to place many parts of the establishment in repair so as to insure their preservation; and for this reason, as well as to secure the completion of unfinished work of various sorts, a much larger force of laborers has been employed during the winter than has been customary, the unusually open season rendering it possible to continue out-of-door work without interruption up to the present time. As a result of the work already done or now under way, the garden and its surroundings will by the opening of the next season be in unusually good repair, though there will still remain many things needing attention in the near future.

Very much of the ground occupied by the garden is wet and spongy, owing to a stratum of clay not far below the surface. To put it into the best condition for cultivating plants that are desirable for the grounds, and, incidentally, to preserve many of the coniferous trees now growing, extensive draining, in addition to that done during the life of Mr. Shaw, is an imperative necessity. Some of this work has already been done, but much remains for the future.

Some of the hedge-rows in the garden, in bad order, or composed of undesirable shrubs, are being gradually replaced by new plants of suitable varieties. For the most



THE LOTUS POND.

part, the present arrangement of the grounds will be maintained, as representing Mr. Shaw's ideas; but with the opening of spring, one or two innovations will be made, which it is believed will render the garden even more attractive to the citizens of St. Louis, and visitors from a distance, than it has been heretofore.

While the will of Mr. Shaw, under which the Trustees of the Garden act as such, provides that the grounds shall be closed to the public on holidays and Sundays, excepting the afternoon of the first Sunday each in June and September, it has been thought that many people would appreciate the privilege of enjoying the garden during the long summer evenings; and to this end, it has been decided to extend the time of closing until half an hour after sunset, although taking this step has involved the employment of additional help, as well as other measures which it had not been thought expedient to adopt in the past.

As far as possible, restrictions upon the public have been avoided, and the small charge formerly made for the care of parcels at the gate, has been done away with. But for the protection of the grounds, and the comfort of visitors, the following regulations (substantially the same as those in force during Mr. Shaw's life) have been adopted and posted for the guidance of the public, and will be enforced:—

The garden is open to the public free of charge daily (holidays excepted) from 8 a. m. until half an hour after sunset. It is closed on Sunday, excepting the first Sunday each in June and September, when it is open from 2 p. m. until sunset.

The offices, herbarium, library, and private greenhouses, are open only to authorized students, or persons having business with the Director or Head Gardener.

Lunches, baskets, satchels, and parcels of every description, must be left outside. If small, they may be cared for by the Gate-keeper, who will make no charge for her services.

Visitors are particularly requested not to handle specimens, nor to pick flowers, fruit, or leaves, or in any way mutilate or deface any plants or other property in or about the grounds.

Intoxicated or disorderly persons will be refused admittance.

Smoking is not allowed.

Any infringement of these regulations, or any discourtesy on the part of employees of the garden, should be at once reported to the Director.

The object of the steps indicated above, is primarily to preserve and improve the garden as a means of contributing to the pleasure and instruction of the citizens of St. Louis and their guests, to whom the garden has always been an object of attraction. But this is only one of several objects contemplated and provided for in the will of Mr. Shaw; and on assuming the responsibility left to them, the Trustees of the Garden adopted the following broad outline for the guidance of the Director in planning and carrying on the work assigned to him: —

1. To continue or even augment the present ornamental features of the garden.

2. To add to its botanical usefulness and interest by the introduction, as opportunity offers, of plants representative of the American flora, so that, other things being equal, these shall ultimately be largely represented and may even preponderate outside of the greenhouses, giving, then, in the garden, an epitome of the leading characteristics of our native flora.

3. To carry into execution, as rapidly as possible, a system of correctly naming and labeling all plants in the garden, with the exception of such as may be used in ribbon-gardening or for other exclusively ornamental purposes.

4. To provide fire-proof quarters for the invaluable herbarium of the late Dr. George Engelmann, and to immediately mount it in the proper manner, so as to insure its preservation and availability for scientific use. Also, to provide for and add to the general herbarium (based on that of Bernhardt) now at the garden, with the special object of ultimately making it complete in good representatives of American plants.

5. To arrange, bind, and index the books and pamphlets at the garden. Also, to provide more ample but equally safe accommodations for the library, to bring it up to date as rapidly as possible, to enter subscriptions for periodical publications, and to keep it abreast of the times, and in the most useful form, by the purchase of important publications as they shall appear, and by the proper indexing of periodicals and pamphlets.

6. To secure a botanical museum, containing material needed for study or calculated to advance general or special knowledge of botany.

7. To direct the main energy of research for the present toward assisting in the completion of a systematic account of the flowering plants of North America, by the publication of monographs of different Orders and Genera, illustrated when this may seem desirable; and to specially cultivate representatives of such groups for purposes of study.

8. To gradually acquire and utilize facilities for research in vegetable histology and physiology, the diseases and injuries of plants, and other

branches of botany and horticulture, as special reason for developing one or the other may appear.

9. To make the facilities of the garden useful in botanical and horticultural instruction, as they increase and opportunity for such work appears: meantime, in all feasible ways, to attract to the School of Botany students of promise, and to provide for their instruction and the best use of their time as investigators.

10. To take steps looking to the early appointment of six "garden pupils," — youths with at least an elementary English education, who shall be regarded as apprentices in the garden, working under the direction of the head gardener and foremen, and shall hold scholarships yielding \$300.00 per year each, together with free lodging near or in the garden, and free tuition in the School of Botany; and who, after having worked for six or more years (as shall ultimately prove best) in the different departments of the garden, and proved proficient in its practical work, may be admitted to examination for a certificate of proficiency in the theory and practice of gardening.

11. To have in mind, in appointing associates for the Director, their special aptitude in some one of the branches indicated above, so that with each appointment the efficiency of the institution for instruction and original work may be broadened and increased.

One of the most practical and directly useful of the steps indicated in this policy, is the provision of scholarships for garden-pupils; and for this reason, it has been one of the first to receive attention. Under authority from the Board, the following announcement concerning such scholarships was issued early in December; and while the step is quite experimental, it is hoped that suitable care in carrying out its provisions may produce good results in the training of thoughtful and well-read gardeners.

In accordance with the intention of its honored Founder, the Trustees of the Garden propose to provide adequate theoretical and practical instruction for young men desirous of becoming gardeners. It is not intended at present that many persons shall be trained at the same time, nor that the instruction so planned shall duplicate the excellent courses in agriculture now offered by the numerous State Colleges of the country, but that it shall be quite distinct and limited to what is thought to be necessary for training practical gardeners.

To this end, the following resolution was adopted by the Trustees, at a meeting held on the 19th of November, 1889: —

"*Resolved*, That there be established the number of six scholarships for garden pupils of the Missouri Botanical Garden, to be available on and after April 1, 1890, such scholarships to be awarded by the Director of the Garden on the results of competitive examination, except as here-

inafter provided, to young men between the age of 14 and 20 years, of good character and possessing at least a good elementary English education; each scholarship to grant such privileges and be subject to such conditions as are provided below or may subsequently be provided by the Trustees of the Garden.

"Until otherwise ordered, two such scholarships shall be reserved for candidates to be named by the State Horticultural Society of Missouri, and the Florists' Club of St. Louis, respectively; provided, that such candidates shall be given scholarships only after passing satisfactory preliminary examinations, and shall be subject after appointment to all tests and regulations prescribed for other candidates and pupils, and that if the names of such candidates are not presented by the societies designated, within sixty days after such action is requested by the Director, the vacancies may be filled by him on competitive examination, as in other cases.

"Each scholarship so conferred, may be held by the original recipient for a period not exceeding six years, subject to the following conditions: —

"Each garden pupil shall be required to lead a strictly upright and moral life, and shall be courteous and willing in the performance of all duties prescribed for him. He shall devote his entire time and energy to the labor and studies prescribed for him, except that from time to time he may be granted leave of absence to visit his home or for other good reason, at the discretion of the Director, provided that the aggregate of such absences in any calendar year shall not exceed thirty days. He shall also show such ability in his work and studies as to satisfy the Director that it is advantageous for the scholarship to be held by him; and from time to time he may be subject to both theoretical and practical examinations, or may be given special tasks calculated to test his knowledge or resources. Failure to meet the requirements in any one of these respects, making due allowance for extenuating circumstances, shall forfeit all claim on any scholarship, which may then be awarded to another person in the prescribed manner.

"Garden pupils, appointed as above indicated, shall be regarded as apprentices in the Botanical Garden, and as such shall be required to work in it under the direction of the Head Gardener, performing the duties of garden hands. They shall be successively advanced from simpler to more responsible tasks; and in such order as may seem best, shall be transferred from one department of the Garden to another, until they shall have become thoroughly familiar with the work of all.

"To the end that garden pupils shall be repaid for their services to the Garden, and that the absence of pecuniary means need not deter any young man from obtaining such training as is contemplated, each regularly appointed garden pupil holding a scholarship shall be entitled to the following wages, payable in equal installments at the end of each fortnight: For the first year, \$200.00; for the second year, \$250.00; and for each year after the second, \$300.00; together with plain but comfortable lodgings convenient to the Garden.

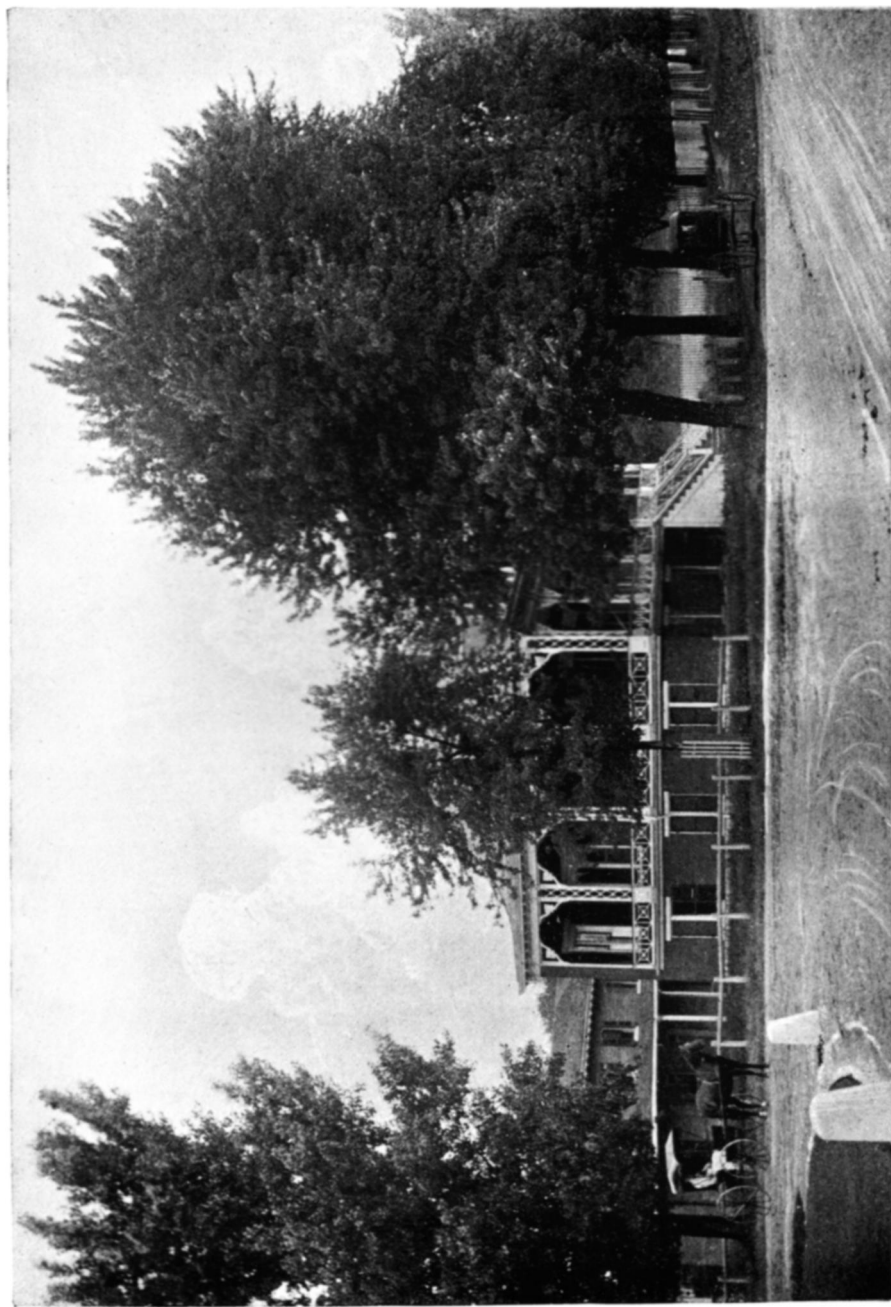
"In order that they may have opportunity to become instructed in the theoretical part of their profession, and in subjects connected therewith, such pupils shall not be required to do manual work in the Garden for more than five hours per day after the first year, devoting the remainder of their time to the study of horticulture, forestry, botany, and entomology, under the direction of the Director of the Garden; and they shall for this purpose be granted free tuition in the School of Botany of Washington University. They shall also receive practical instruction in surveying and book-keeping, so far as a knowledge of these subjects is held to be necessary for a practical gardener charged with the management of an estate of moderate proportions.

"At the expiration of six years, the holder of a scholarship, who is recommended as practically proficient, shall be entitled to examination by the Garden Committee, in the subjects prescribed for study, and on passing such examination to the satisfaction of the Committee and Director, he shall receive a certificate of proficiency in the theory and practice of gardening, signed by the Chairman of the Garden Committee and the Director of the Garden. In exceptional cases, candidates may be admitted to examination at the end of the fifth year, when this shall be deemed advisable by the Garden Committee, and on passing such examination satisfactorily, shall be entitled to a statement to that effect from the Director, and to the regular certificate on the subsequent completion of a year's work to the satisfaction of their employers."

All applicants for scholarships, whether named by the societies indicated above or not, will be examined in the following subjects, so far as they are taught in the upper classes of grammar schools: English grammar, reading, writing, and spelling; arithmetic; and geography. If the number of candidates for scholarships exceeds the number of scholarships to be awarded at any time, all candidates except those named by the societies indicated, will be required to pass a further competitive examination, which will cover history of the United States, English literature, algebra, German, the elements of botany, zoology, and physiology, and such other subjects as may from time to time be prescribed. It is not intended to make the passing of examinations in these last-named branches a requirement for the award of scholarships, but merely in this way to obtain a means of selecting the most deserving and able candidates when it is necessary to reject some. Hence, the Director will always use his discretion as to the importance to be attached to greater or less proficiency in any of the subjects covered by competitive examinations, as well as to the other qualifications of candidates admitted to such examinations.

Under the above provisions, the following announcement is made:—

Scholarships, not exceeding six in number, will be awarded by the Director of the Garden, prior to the first of April next. In case the entire number are not then awarded, the remainder will not be awarded until the corresponding period of the following year, and vacancies which may subsequently arise will be filled annually, after published announcement.



LODGE FOR GARDEN PUPILS.

Applications for scholarships, to receive consideration, must be in the hands of the Director not later than the first day of March. The preliminary examination for all candidates will be held on Tuesday, March 4th, at the Shaw School of Botany, 1724 Washington avenue, St. Louis, between 10 a. m. and 5 p. m. If the number of applicants exceeds six, competitive examinations, based on the subjects indicated above, will be held at the same place on Friday and Saturday, March 7th and 8th.

Candidates who live at places remote from St. Louis, and who wish to be spared the expense of coming to the city for examination, may send with their application, the name and address of the principal of the nearest high school or of some approved private school, in case he is willing to take charge of such examination for them; but all applications of this character must be in the hands of the Director not later than the middle of February. If the examiner is approved, papers will be sent to him before the date set for the examination, and on the payment of a fee of \$2.00 to him, the candidate may write on them in his presence. If competitive examinations are also required, the same examiner will receive the papers for them in time to submit them to the candidate on the date set for similar examinations in St. Louis, on receipt of an additional fee of \$3.00 as a partial payment for his time in conducting the examination. The papers written on such examinations will be forwarded by the examiner to the Director, who will read them in connection with those written in St. Louis, before making any awards.

Successful candidates will be started in their duties as garden pupils on Tuesday, April 1st, at the Botanical Garden. They will be lodged in comfortable rooms in a spacious dwelling adjoining the Garden, under the charge of the Head Gardener or some other competent person. It is not the intention of the Trustees to furnish table board, but good board can be obtained in the lodging house or elsewhere, at the usual cost. The lodging house will include a reading-room supplied with the more valuable horticultural and agricultural papers, and also with a small but standard collection of books on the same subjects, which the pupils will have free use of. So far as possible, the surroundings of pupils will be made homelike, and without assuming any responsibility for their behavior, an effort will be made to subject them to influences calculated to insure for them gentlemanly manners and habits of industry and investigation.

During the first year of their scholarship, garden pupils will work at the practical duties of the Garden nine or ten hours daily, according to the season, the same as regular employees of the Garden, and will also be expected to read the notes and articles referring to the subject of their work, in one or more good journals.

In the second year, in addition to five hours' daily work of the same sort, they will be given instruction and will be required to do thorough reading in vegetable gardening, flower gardening, small-fruit culture, and orchard culture, besides keeping the run of the current papers.

In the third year, in addition to five hours of daily labor, they will be

instructed and given reading in forestry, elementary botany, landscape gardening, and the rudiments of surveying and draining, and will be required to take charge of clipping or indexing some department of the current gardening papers for the benefit of all.

In the fourth year, besides the customary work, they will study the botany of weeds, garden vegetables, and fruits, in addition to assisting in the necessary indexing or clipping of papers, etc., and will be taught simple book-keeping, and the legal forms for leases, deeds, etc.

The course for the fifth year, in addition to the customary work, will include the study of vegetable physiology, economic entomology, and fungi, especially those which cause diseases of cultivated plants; and each pupil will be expected to keep a simple set of accounts pertaining to some department of the Garden.

In the sixth year, in addition to the manual work, pupils will study the botany of garden and green-house plants, of ferns, and of trees in their winter condition, besides the theoretical part of special gardening, connected with some branch of the work that they are charged with in the Garden.

From time to time, changes in this course will be made, as they shall appear to be desirable, and the effort will be made to give the best theoretical instruction possible in the various subjects prescribed; but it is not intended to make botanists or other scientific specialists of garden pupils, but, on the contrary, practical gardeners.

Applications for scholarships, and any inquiries regarding them, are to be addressed as below, on or before the dates mentioned above. If requested, blanks will be mailed to persons who contemplate making application.

WILLIAM TRELEASE,
Director of the Missouri Botanical Garden,
St. Louis, Mo.

The intimate relations established by Mr. Shaw between the Garden and the School of Botany, when the latter was created, have been recognized and strengthened by the action of the Directors of Washington University, who have granted free tuition in this department to garden pupils who may be given scholarships; and by the action of the Trustees of the Garden in authorizing the Director, under certain restrictions, to detail persons in the employ of the garden to give assistance in the School of Botany, and to supply from the garden, material needed for purposes of instruction and study in the school. The following general statement concerning the School of Botany, is extracted from the latest catalogue of Washington University: —

HENRY SHAW SCHOOL OF BOTANY.

ESTABLISHED JUNE 8, 1885.

Advisory Committee:—The Chancellor of the University, *ex officio*, Henry Shaw,* John H. Lightner, Wm. G. Farlow, M. D., Geo. J. Engelmann, M. D.

Instructors:—William Trelease, Engelmann Professor of Botany, A. S. Hitchcock, Assistant (detailed from the garden for partial service), William Townsend Porter, M. D., and Amand N. Ravold, M. D., Demonstrators in Bacteriology.

GENERAL INFORMATION.

The laboratory of the School of Botany is temporarily located at 1724 Washington Avenue, and a good working library, containing the usual laboratory manuals and periodicals, with memoirs on subjects likely to be studied, is kept in the laboratory for reference. This is being constantly added to, and will be made as complete as possible in any department of botany in which advanced students present themselves. The herbarium of the school, now being formed, contains already about 14,000 sheets of specimens, and will include as complete a collection as can be made of the wild and cultivated plants of the region about St. Louis. Full sets of duplicate specimens are supplied for the use of students of particular groups of plants. Advanced students will also have the privilege of consulting, under certain restrictions, the excellent herbarium and library of the Botanical Garden, including the Engelmann herbarium and library, as well as several sets of *Fungi exsiccati* and the private cryptogamic herbarium and library of the professor.

Material for laboratory use, and for the illustration of lectures, is furnished in abundance by the Garden, which, with its greenhouses and arboretum, is open to students of the School of Botany for all necessary purposes of study. In case duplicate herbarium specimens which have been studied, are desired by members of the class, they may be retained, if application is made at the beginning of the course, and are charged for at cost. Where alcohol and other expensive substances are used in quantity, as in work on bacteria, a special charge for material used will be made at the end of the course.

The instrumental equipment of the laboratory includes one microscope by Zeiss, with a working series of objectives from AA. to 1-18 inch homogeneous immersion, and accessories for spectroscopic studies and work with polarized light; ten microscopes by Leitz, with the objectives needed for the best botanical work (including nine oil immersion 1-12 in. lenses, one 1-16 in. oil immersion, and one 1-20 in. oil immersion), polariscope, camera lucida of several patterns, etc.; seventeen dissecting microscopes, mostly by Bausch and Lomb; and a

* Deceased.

number of simple tripods; together with instruments, pipettes, reagents, and other necessities. Microscopes, dissecting needles, and glassware, are furnished by the laboratory, members of the class being held responsible for breakage or other injury. Razors or other instruments for sectioning are not supplied by the laboratory for ordinary work.

A special bacteriological laboratory, providing tables for thirteen workers, has been equipped with sterilizing apparatus, brood-oven, microtomes, and other accessories needed, and is in successful operation. It is hoped that ultimately another small laboratory may be devoted to advanced investigation in bacteriology, by trained physicians.

The working year for the School of Botany is divided into three terms: the first beginning with the College year and ending at the Christmas holidays; the second beginning immediately after New Years and ending the last of March; and the third beginning about the first of April and continuing until the Saturday before commencement. Classes for the study of particular groups of plants, and special work for advanced students, are planned as the demand for them appears. Whenever it is practicable, a class for day or night work, in any branch that can be taught with profit, will be formed on the application of six persons. The elementary classes are so conducted as to require no previous knowledge of botany; but admission to advanced classes depends upon a sufficient familiarity with the subjects to render the work profitable. Persons desirous of entering any class should present themselves promptly at the opening of the course. Correspondence is invited from those wishing special instruction.

Correspondence should be addressed to

WILLIAM TRELEASE,
Shaw School of Botany,
ST. LOUIS, MO.

Up to the present time, the number of special students in the School of Botany has been small, and there is no indication that they will become numerous in the immediate future; but this is not a source of either surprise or disappointment, for it was foreseen from the first. The work of such students, though it has been chiefly of an elementary character, has, I believe, been fairly satisfactory. But the most important work that such a department of a University can accomplish, is that with advanced students, aiming at the solution of some of the many problems that await the investigation of specialists. From the first, it has been the policy of the School of Botany to provide the amplest facilities within its power, for such work; and books and

pamphlets have been liberally bought where needed, for the use of those having such work in hand.

Aside from the instrumental equipment of the School of Botany, the facilities for work now include the library collected by Mr. Shaw, the entire botanical library of the late Dr. Engelmann, the herbaria of Engelmann, Bernhardt, S. B. Buckley, and Riehl, and the private cryptogamic collection and pamphlet library of the Director, in addition to a large number of duplicates from the Gay and Joad herbaria obtained through the interest of the late Professor Gray.

As calculated to be of historical interest in the future development of the Garden, and a desirable basis for noting changes that must be made from time to time, a survey of the grounds has been made, and the results are being embodied in two maps on a scale of twenty feet to the inch, one showing the contours for each two feet of difference in elevation, as well as the general features of the garden; the other accurately locating all buildings, drains, fences, beds, walks, etc., on the premises, and marking the location of even the individual trees in the arboretum and elsewhere. Such a map, though costly, is an indispensable foundation for future operations in improving and developing the grounds. From the notes of this survey, the following areas of the various parts of the garden are obtained: Garden proper, 9.4 acres; Arboretum, 20.5 acres; Fruticetum, 8 acres; Old or Vegetable garden, 3.5 acres; Grove, .6 acre; Lawn, 2.7 acres;—making a total of 44.7 acres. The grounds about the garden also include an equal or greater acreage of pasture-land, which can ultimately be used, wholly or in part, for extensions which may from time to time be found desirable or necessary. Two large green-houses, and several smaller ones, afford facilities for the cultivation of exotics, and for the propagation of tender and half-hardy plants used for bedding during the summer.

It has been popularly supposed, and is frequently stated, that representatives of all plants that are capable of cultiva-

tion in the open air in the latitude of St. Louis, are cultivated at the garden. This impression is very erroneous, and it is probable that it will never be justified. The policy of the present management, however, is to aim at as complete a representation of native plants as may be found practicable, as it is believed that such a collection will not only be most conducive to the advancement of American botany, but at the same time of most interest to visitors from foreign lands, who are found to be more desirous of learning the features of a new flora than of seeing in cultivation the familiar forms of their own. At present, it is impossible to state the number of species in cultivation in the garden, but it is very considerable and receives constant additions. From a descriptive list of the economic plants cultivated in 1886, it appears that there were then in cultivation, two hundred and thirty-two such species. The inventory made by the Administrator of the estate, shows fifty-five named species or varieties of *Agave* and 106 species of named palms; and the collection of cactuses and of several other groups that interested the late Dr. Engelmann, is quite considerable. The educational features of the garden are also supplemented by the extensive variety of trees and shrubs growing in the adjacent Tower Grove Park, which was given to the city by Mr. Shaw; although in its management this park is entirely distinct from the botanical garden, and primarily intended for quite a different purpose.

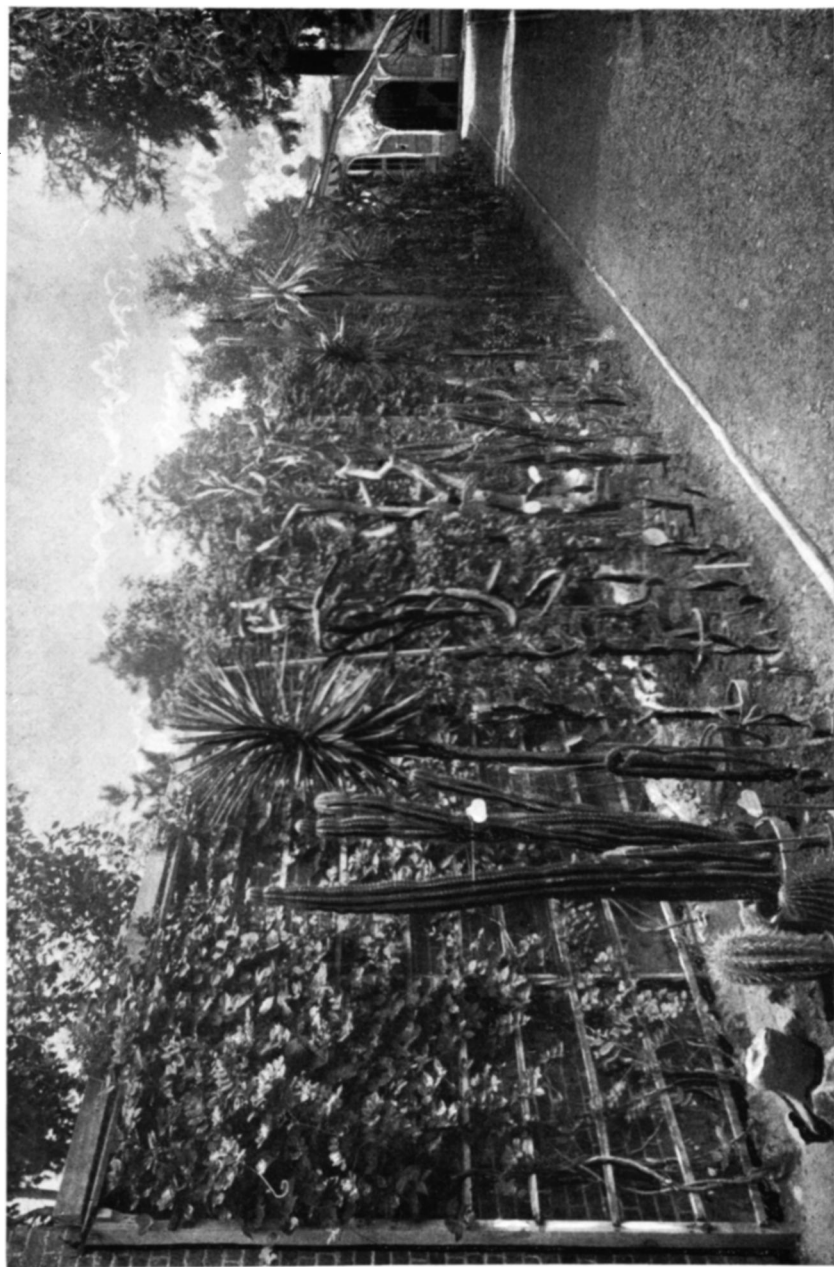
In closing this brief report, it is proper to state that the management of the garden will be grateful to institutions and investigators for copies of their botanical publications or for additions to the herbarium, and that all feasible assistance will be rendered in the performance of work calculated to advance botanical knowledge.

Respectfully submitted,

WILLIAM TRELEASE,

Director.

ST. LOUIS, MO., Jan. 14, 1890.



A CACTUS CORNER.